

# Delivering Solid Green In Pennsylvania with Energy Star



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Commonwealth of Pennsylvania**

# **Commonwealth of PA Governor's Green Government Council (GGGC)**

- Who we are
- What we do
- LESSONS LEARNED & why we feel that Energy Star is KEY part of fixing what is wrong with LEED

## **Governor's Green Government Council (GGGC)**

- Created in 1998 under executive order by the Governor.
- Tasked with “Greening” all aspects of State Government
- Executive Director reports to both the Secretary of DEP and Secretary of DGS
- Physically located in and operates integrally with PA DEP Office of Energy and Technology Deployment (OETD)
- Provides Technical Assistance and Involved with many of the State and Federally Funded (EPA and DOE) programs administered by OETD in addition to serving as a resource for ALL state agencies.
- GGGC Also provides assistance on select high profile private and public sector green building and sustainable site projects. (local government, K-12 sector, etc)

## **Governor's Green Government Council (GGGC)**

- Began with the design and construction of DEP's first green building in 1998 – PA DEP South Central Regional Office Building. (SCROB)
- SCROB, PA DEP's "First Green Building" was the subject of the first in a series of 6 popular GGGC videos on Green Buildings. Videos have played critical role in education and market transformation stateside and nationally.
- Director of Engineering and Building Technology – Full Time Engineer position filled in 1999. GGGC began providing engineering & technical assistance.
- Began working on select green building projects including several LEED pilot projects being administered by DGS.
- Developed comprehensive Green Lease Spec as a result of the MANY Lessons Learned from First Green Building.
- Developed other Tools, Resources, Pubs, Videos, Training Workshops, Technical Support and Services.

# Primary Goals of the GGGC

- **Market Transformation**

  - Address Private and Public Sector Training and Education Needs

  - Demonstrate Practical, Tried and Proven Green Technologies

  - Dispel Myths that Green Costs More (“Green For Less” PPT)

- **Capture Potential in Existing Building Stock**

  - Recognize that existing buildings represent large piece of the pie

  - 80% of school construction in PA is major renovation work

  - Aggressive ESCO program w/ emphasis on green retrofits

- **Study & Refine Green Building Design Process**

  - Integrated Design Process

  - Focus on Environmental “Systems” Thinking

  - Focus on Performance Based Goals and Objectives

# GGGC Services – Executive Director

- Policy & Legislative Review
- Green Power – Commonwealth Purchase
- Monitor other State and Federal Activities
- Address initiatives from Governor's Office
- Address initiatives from DEP and DGS Top Brass
- Oversee GGGC Agency Liaison and Engineering Staff
- Agency Liaison Officer handles programs such as green procurement and purchasing, agency recycling, DGS and state agency alternative vehicles & fuels purchases, etc.

# GGGC Engineering Staff

- Engineering Mission
  - Develop Tools and Resources
  - Focus on Climate Responsive Design, Energy Efficiency, Natural Daylighting and LID
  - Training and Education (Group and Individual)
  - Advanced Technology Renewables Deployment
  - Address Code and Regulatory Barriers Statewide
  - Offer Technical Assistance, Target Sessions, Conduct Design Charrettes and Plan Reviews for Select Green Building Projects Statewide in all building sectors.

# Tools & Resources

- GGGC Website and Linked Tools and Sites
- GGGC Video Series (6 Videos to date)
- What is Green – Fundamentals
- Training Materials on Productivity and Benefits of natural Daylighting, especially K-12 Schools
- HP Green Building Lease Specification
- Emphasis on “Green For Less”, Integrated Design, Systems Optimization and HPGB on a budget.
- GSHP Training, LID Training, etc...
- A/E Selection Guidelines for HPGB Projects



# Training and Education

- HP Green Building Workshops (12 + per year)  
Fundamentals, Green For Less, Integrated Design, LEED
- HP Green School/Daylighting Workshops (3 /yr)
- HPGB Environmental Target Sessions (10 +/-yr)
- HP Green Building Charrettes (1-3 days each, 6+ /yr)
- Energy 10 Trainings (3 /yr)
- Energy Star Trainings (5+ /yr)
- Labs 21 Trainings (1 / yr)
- FEDS Trainings (1-3 /yr)
- Advanced Daylighting /CRD/LID (1-2 /yr)
- Other special trainings for DGS and other state agencies and their design teams as needed, per request. (also Local Govt, Health Care, C/University, and K-12 Sectors, etc.)

# GGGC Tech Assist / Projects

- Adams County Prison
- PPL Headquarters
- Liberty Property Trust 50 Story High-rise (Now Comcast Center)
- PENN DOT Welcome Center – Delaware Water Gap (DGS)
- West Chester School of Music (DGS)
- West Chester University - Swope Hall Renovation (DGS)
- Slippery Rock University - Regional Learning Alliance (SSHE)
- Fulton County Medical Center & Geisinger Medical Center
- Pennsylvania Housing Finance Agency
- Mercyhurst College
- Millersville University
- Numerous DCNR Projects including Penn Nursery Project
- DEP Projects, DEP Lab, commissioning issues on 1<sup>st</sup> Green Buildings
- Military Affairs – Striker Brigade
- Greenwood Charter School
- Mill Creek School District – J.S. Wilson MS
- Many Others.....(code, regulatory, and LID/storm water projects including green energy efficient affordable housing pilot projects)

# PA DEP Green Building Experience with Delivering Green for Less

<u>Project</u>	<u>Performance</u>
DEP SCRO (LEED Bronze) \$89/SF	Poor
DEP Cambria Regional Mining Office (Gold) \$98/SF	Exceptional
DEP California Regional Mining Office (Gold) \$100/SF	Excellent
DEP Moshannon Regional Mining Office (Gold) \$105/SF	Excellent
DEP Southeast Regional Office (Gold)	Fair/TBD
DEP Lab (Pending)	TBD

# PA DEP Cambria Office

- To Date our Best Performing HPG building
- Aggressive Use of Natural Daylight and CRD
- 34,000 BTU/SF/Year 1 w/out PV on line
- LT 24,000 BTU/SF/Yr with 10KW PV
- ENERGY STAR Score was 93 (not labeled)
- LEED Gold Certification
- Cost was \$98 / SF (Sticks & Bricks /Design Build)
- Daylighting is working fair to good (some issues)
- Occupant Comfort High / Complaints very low
- ICF Walls, T-pane glass, SIPS Roof, GSHP, etc



Cambria Office

# DEP California Regional Mining Office

- Demonstrates Good Energy Performance with a clean and simple “No Frills” Design.
- Design uses many elements from Cambria including south facing clerestories, deep roof overhangs/passive shading and light shelf technology
- LEED Gold with a very simple design and low budget
- Primary Focus was on Exceptional Envelope (ICF Walls) Excellent Glazing (Triple low E) SIPS Roof, and Very Aggressive use of Climate Responsive Design and natural Daylighting
- Building performance would have been further enhanced if GSHP system had been used as in Cambria.





California Office

# DEP Moshannon Office

- Received USGBC Gold Certification
- Cost was \$105.00 (“sticks and bricks”)
- Aggressive Use of Natural Daylighting & CRD
- North daylighting well liked by occupants
- ICF Walls, HP Glass, High R Value Roof
- No GSHP due to abandoned mines below
- 10 KW wind turbine added in 2005
- Energy Star Certification Likely (approx 50,000 btu/sf/yr)





Moshannon Office

# DEP South East Regional Office

- LEED Gold was obtained despite fact that this was our second most challenging project (Second only to DEP Lab Retrofit Project)
- Brownfield Site in Urban Infill scenario severely limited possibilities for effective traditional climate responsive design strategies such as passive shading and lower cost natural daylighting strategies.
- West façade was detrimental to energy use.
- Core Atrium was creative solution to provide some indirect natural daylighting to core of building.
- Metal Skin wall system (not ICF walls) was very problematic and prone to leakage and infiltration.
- 10,000 gallon rain Cistern saves about 450,000 gallons/yr.
- Despite challenges and major design and commissioning issues (most resolved) people/employees love the building.





Norristown Office

# What did we Learn?

- Of all of our own Green Building projects, out of the 20 or so LEED Certified projects in PA, and of the long list of over 80 LEED registered projects in PA, despite being first and second in the nation in the number of green buildings built - *a relatively low percentage of these “green buildings” will actually have energy performance that is considered exceptional.* Based on what we have learned and what we are hearing from others, on average, annual energy performance of most typical green building projects nationally is probably generally even worse. Some US and internationally recognized green building “glamour” projects report first cost increases putting projects in \$150 to \$300/sf range while experiencing 200 to 400% increase in energy use for these impractical green LEED buildings....

Why is this????....

# **Unseasoned Design Professionals are Focusing on “Silly” and “Sexy” Green Stuff and Forgetting what really matters....**

## **Good Climate Responsive Design**

- Weighting of Points is not balanced such that important things like water and energy and emissions reductions are getting proper attention.
- Project teams are point shopping for easiest, lowest hassle points in lieu of focusing on integrated design and delivering good, fully optimized, well engineered buildings.
- Lack of recognition by LEED for importance of basic things like aggressive use of natural daylighting and natural ventilation, passive shading and well insulated envelopes.

# A NEW DIRECTION

- Recognizing the problem, in 2003 following a presentation on ENERGY STAR by DOE and EPA representatives in Philly, the GGGC developed a new strategy centered around the development of a hybrid program integrating the best of LEED with the best of ENERGY STAR buildings program elements. Resources available through the DOE Rebuild America program were used to help address training needs – good green design and what really makes a building energy efficient...

# Integration of ENERGY STAR and DOE Rebuild America

- The GGGC realized that the two programs were very complimentary and both had similar objectives.
- Both ENERGY STAR and Rebuild were closely tied to our HP Green Buildings Program. The GGGC realized the potential synergies of integrating Rebuild and ENERGY STAR into our HP Green Buildings Initiative – starting with the Collage and University and K-12 Sectors.
- We had a Rebuild America (DEP) program manager retire.... This created an opportunity to think outside the box and start fresh.
- Structured a new position centered around integrating ENERGY STAR, Rebuild America- and designed to work hand in hand with our GGGC green building team.
- GGGC served as interim manager of ENERGY STAR and Rebuild until the position was filled.
- GGGC provided 9 months of intensive technical training of Mark hand – the new ENERGY STAR/Rebuild Coordinator. GGGC continues to provide administrative and technical oversight of the programs as an integrated approach.
- Long Term Vision: “PA LEED Plus” (LEED plus ENERGY STAR)

# Regional Staff Buy-In

- Conducted a one day ENERGY STAR training of regional staff (with funding from DOE) Fall 2003
- Rolled out the proposed ENERGY STAR program conceptually & Explained how it is a natural complimentary program to fit nicely in with our existing LEED HPGB program
- Obtained full support of regional staff (vote to move forward with ENERGY STAR was unanimous.
- Encouraged Secretary McGinty to sign MOU Making PA DEP an official ENERGY STAR State partner.
- ENERGY STAR MOU Signed April 2004



# ENERGY STAR Train the Trainer for DEP Regions

- Initial round of trainings were held for all staff and other agency representatives (Total of 80 attended 2004 training)
- Series of Regional Trainings were held in conjunction with other DEP and DOE Rebuild America Trainings – mostly centered around Collage and University Sector (Fall 2004)
- April 12, 13 2005 Conference Event – we expanded focus of Energy Star trainings to K-12 and other building types.
- Summer and Fall of 2005 continued regional trainings on ENERGY STAR Portfolio Manager, Target Finder and Cash Flow Opportunity Manger
- Integrated ENERGY STAR Trainings in with green building/LEED High Performance Green Building and Advanced Daylighting Training events

# Off and Rolling

- DEP Headquarters and Regional Office Staff began benchmarking buildings statewide in Spring of 2005.
- NWRO has benchmarked an entire school district. Findings were shocking.
- Several other Colleges and Universities and K-12 School Districts who attended out training Sessions are working on benchmarking their own buildings with our assistance.
- NCRO is working with schools and universities in their region

# And Rolling....

- DEP HQ is facilitated benchmarking of high profile high performance green building projects including our own DEP green buildings and several select school and office projects to determine how effective our past green projects really are in terms of energy efficiency.
- DEP OETD Energy Star Manager Mark Hand is working with DGS to collect and enter data on all State Office Buildings.

# Into the Future....

- DEP has proposed that ENERGY STAR Portfolio Manager be the basis for compliance with PA's Energy Management Executive Order issued in December 2004.
- DEP is working with PA Dept. of Education to make Energy Star Target Finder and PM an integral part of the statewide Green Schools initiative.

# PPL Headquarters

- Our First Building to Achieve both LEED and Energy Star recognition.
- USGBC LEED Gold
- Energy Star Score - 80



PPL Headquarters

# Londonderry School

- Our Best Performing School @ 31,000 btu/sf/yr
- Aggressive use of Natural Daylighting
- Aggressive use of Passive Solar and High Mass
- Aggressive Use of Natural Ventilation
- Exceptional Envelope (ICF Walls, R-50 Roof ...)
- Radiant Hot Water Floor (slab) heat
- Cost was \$105.00/SF (Sticks and Bricks)
- Energy Star Score Pending - likely to be above 85





Londonderry School



# Mill Creek School District – J.S Wilson Middle School

- First project where the GGGC/DEP has been able to use the ENERGY STAR tools in conjunction with a full blown LEED green building project.
- Project team was struggling with design.
- GGGC stepped in – conducted an environmental targeting session – used ENERGY STAR Target Finder as the basis for proposed energy goals for the project. Specific written quantifiable environmental objectives were developed during this session – PRIOR to any discussion of LEED or the LEED score-sheet. Clear Performance Objectives have been established independent from LEED points.

# Mill Creek School District – J.S Wilson Middle School

- Advanced Daylighting and High performance Green Building Workshop and design Exercise was held on August 30 and Sept 1 of 2005. Project is on Track and is expected to deliver exceptional energy and water performance.
- The J.S.Wilson project and the model process developed for this project is the basis for future green building projects in PA.

# **Wilson Middle School – Pushing the Threshold on Energy Performance – Setting a New Standard for Design in PA:**

- Minimum ENERGY STAR Score proposed by PA DEP during the targeting session for JS Wilson was 85. (approximately 40,000 BTU/SF/year) During that session – the designers reported that they had preliminary energy modeling data on the current schematic design showing that it would may be possible to get below 35,000 btu/sf/yr.
- Two weeks after the DEP/GGGC sponsored targeting session, the owner reported that the design team and owner had elected to raise the project energy performance goal to a desired minimum performance of 90 (approximately 30-35,000 BTU/SF/Year), with a score of 95 (most likely under 30,000 btu/sf/yr) as a desirable target, if budget permits.
- 10 members of the design team traveled to see first hand, the benefits of the daylighting in PA DEP's Moshannon Office. The team then traveled to Harrisburg PA for a two day advanced daylighting training workshop. (workshop compliments of DOE Rebuild America)
- Climate responsive design and aggressive use of natural daylighting and high performance envelope design is now at the center of the design for the project which is well on track for meeting its targeted performance.

Visit

[www.hdg-ltd.com/jswilson.html](http://www.hdg-ltd.com/jswilson.html)

For more information on the J.S.  
Wilson Project